



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,508	10/16/2001	Bo Zheng	AMAT/5951/CALB/COPPER/PJS	6901

32588 7590 07/30/2003

APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

NICOLAS, WESLEY A

ART UNIT	PAPER NUMBER
----------	--------------

1742

5

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,508

Applicant(s)

ZHENG ET AL.

Examiner

Wesley A. Nicolas

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-68 is/are pending in the application.
- 4a) Of the above claim(s) 1-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 33-58 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 24.
- 4) ☒ Interview Summary (PTO-413) Paper No(s). 5.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restriction

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-32, drawn to a apparatus, classified in class 204, subclass 242.
 - II. Claims 33-58, drawn to an method, classified in class 205, subclass 102.
2. The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used to practice another and materially different process such as an electroless process.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

Art Unit: 1742

5. During a telephone conversation with Todd Patterson on July 15, 2003, a provisional election was made **with** traverse to prosecute the invention of Group II, claims 33-58. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-32 have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

7. The abstract of the disclosure is objected to because it should describe the claimed (*i.e.* elected) invention. Correction is required. See MPEP § 608.01(b).

Claim Objections

8. Claim 35 is objected to because of the following informalities: the term "cycles" is unclear. Does the term "cycles" refer to frequency as in cycles/sec. (*i.e.* Hz)? Claim 35 is being interpreted as referring to Hz.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 33-41, 44-54, and 57-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Collins (U.S. 2003/0038036 A1).

Claim 33 is rejected because Collins teaches a method of electroplating comprising:

- providing an electrolyte container (Fig. 8, numeral 800) configured to receive and maintain a fluid electrolyte therein, the electrolyte container having an anode disposed with the electrolyte container (Fig. 8, numeral 820);
- providing a head assembly positioned above the electrolyte container, the head assembly including a wafer holder for supporting a wafer and a cathode (Fig. 8, numerals 110 and 830),
- positioning a wafer in the electrolyte container in contact with the fluid electrolyte (Fig. 8, numeral 110 below electrolyte surface); and
- applying a varying amplitude waveform to the cathode and anode in an electroplating process (Abstract: "varying the duration of the pulse and continuously decreasing the amplitude...").

It should be noted that the intended use in the preamble, "for electroplating metal into sub-quarter micron integrated circuit features" is not being given the effect of a limitation because it does not breathe life and meaning into the claim. In order to limit the claim, the preamble must be "essential to point out the invention defined by the claim." Kropa v. Robie, 88 USPQ 478, 481 (CCPA 1951). A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. In re Hirao, 535 F.2d 67, 190 USPQ 15 (CCPA 1976); Kropa v. Robie, supra.

Claim 34 is rejected because Collins teaches a cyclical waveform having a small magnitude voltage pulse and a large magnitude voltage pulse (Fig. 4, positive and negative pulses at different magnitudes).

Claim 35 is rejected because Collins teaches of applying a cyclical wave form of between about 1 Hz to about 100 KHz (which overlaps Applicant's claimed 5-50 cycles which is being interpreted as Hz.) (¶ 0038).

Claim 36 is rejected because Collins teaches that the wave form in a square voltage waveform (Fig. 4).

Claims 37-41 are rejected because Collins teaches the amplitude of the voltage pulses being from about 0.5V to about 5V (claim 9 and Fig. 4).

Claims 44-45 are rejected because Collins teaches that the large and small magnitude voltage pulses have a duration of about 50 milliseconds to about 500 milliseconds (Claim 8, 1Hz to 100 KHz = 1000 ms to 0.01 ms).

Claim 46 is rejected because Collins teaches a method for electroplating metal, comprising:

- providing an electrolyte having an anode disposed therein (Fig. 8, numeral 820);
- providing a cathode in electrical communication with a wafer to be plated (Fig. 8, numerals 110 and 830) and
- applying a varying amplitude voltage waveform to the cathode and anode in a plating process (Abstract: "varying the duration of the pulse and continuously decreasing the amplitude...").

Claim 47 is rejected because Collins teaches a cyclical waveform having a small magnitude voltage pulse and a large magnitude voltage pulse (Fig. 4, positive and negative pulses at different magnitudes).

Claim 48 is rejected because Collins teaches of applying a cyclical wave form of between about 1 Hz to about 100 KHz (which overlaps Applicant's claimed 5-50 cycles which is being interpreted as Hz.) (¶ 0038).

Claim 49 is rejected because Collins teaches that the wave form in a square voltage waveform (Fig. 4).

Claims 50-54 are rejected because Collins teaches the amplitude of the voltage pulses being from about 0.5V to about 5V (claim 9 and Fig. 4).

Claims 57-58 are rejected because Collins teaches that the large and small magnitude voltage pulses have a duration of about 50 milliseconds to about 500 milliseconds (Claim 8, 1Hz to 100 KHz = 1000 ms to 0.01 ms).

Allowable Subject Matter

11. Claims 42-43 and 55-56 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

The specific current density set forth in claims 42-43 and 55-56 was not taught or suggested by the prior art of record.

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. 6,197,179 (Arlt et al.) - Arlt et al. teach of superimposing different pulses together and further teach of saw tooth waveforms.

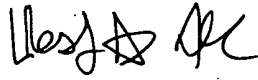
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley Nicolas whose telephone number is (703)305-0082. The examiner can normally be reached on Mon.-Thurs. from 7am to 5pm.

The Supervisory Primary Examiner for this Art Unit is Roy King whose telephone number is (703) 308-1146.

The fax number for this Group is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.


Wesley A. Nicolas

July 22, 2003

Interview Summary

Application No.

09/981,508

Applicant(s)

ZHENG ET AL.

Examiner

Wesley A. Nicolas

Art Unit

1742

All participants (applicant, applicant's representative, PTO personnel):

(1) Wesley A. Nicolas.

(3) _____.

(2) Todd Patterson.

(4) _____.

Date of Interview: 15 July 2003.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
If Yes, brief description: _____.

Claim(s) discussed: 1-58.

Identification of prior art discussed: N/A.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Mr. Patterson agreed to elect Group II, the details of which are submitted herewith.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required